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# **Information Paper**

## **Labour Force Survey Sample Design**

**1997**



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# SURVEY METHODOLOGY

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## COLLECTION METHODOLOGY

LFS information is obtained from the occupants of selected dwellings by specially trained interviewers. Interviews are generally conducted during the two weeks beginning on the Monday between the 6th and the 12th of each month. The information obtained relates to the week before the interview (i.e. the reference week). Selected dwellings remain in the survey for eight months.

Prior to August 1996, all interviews were conducted face-to-face at the homes of respondents. Over the period August 1996 to February 1997, the ABS introduced the use of telephone interviewing to collect LFS data. With telephone interviewing, the first interview is conducted face-to-face. Subsequent interviews are then conducted by telephone, providing this is acceptable to the respondent. Telephone interviewing has been shown to provide data of comparable quality to that obtained from face-to-face interviews. It also requires less interviewer travel and, hence, lowers the costs of the survey.

In both face-to-face and telephone interviews, interviewers attempt to collect all information about each household member from one adult. If this adult is unable to provide the required information for other household members, the others will be interviewed personally.

## SELECTION OF DWELLINGS

For the LFS, private dwellings (houses, flats, etc.) and non-private dwellings (hotels, motels, etc.) are separately identified and sampled.

The sample of private dwellings is obtained by using a multi-stage approach:

- Australia is divided into about 70 geographical regions, which are then stratified according to population density and growth. A sample of census collection districts is then randomly selected to represent each region.
- Each collection district is divided into smaller areas called blocks. One block is selected randomly from each district to represent the others.
- In urban areas, a sub-sample of dwellings in the selected block is taken. Blocks in rural areas contain fewer dwellings, and all dwellings in a selected block are included in the survey.

In less populated areas, an additional stage precedes the selection of collection districts to ensure that the sample is not too geographically spread, which would lead to unacceptable enumeration costs.

The sample of non-private dwellings is obtained by compiling a list of all non-private dwellings in Australia. A sample is taken from this list in such a way that each region across Australia and each different type of dwelling is represented. For smaller non-private dwellings, each occupant is included in the survey; for larger dwellings, a sub-sample of occupants is taken.

## INTRODUCTION

The Australian Bureau of Statistics (ABS) has been conducting the Labour Force Survey (LFS) since 1960. The survey was undertaken on a quarterly basis before February 1978 and has been monthly since then. The design of the survey has remained broadly the same since its introduction, but is regularly updated to ensure it is the most appropriate for the provision of accurate labour force statistics.

The ABS reselects the LFS sample every five years, using preliminary data from the Census of Population and Housing, to ensure that the sample continues to accurately reflect the distribution of the Australian population. As well, the opportunity exists to examine the overall design to ensure it remains efficient and cost-effective. A new sample has been selected using 1996 Census information and will be gradually implemented over the period September 1997 to April 1998.

This paper outlines the sample design and methodology of the survey, how it has changed over time, and describes the changes arising from the most recent redesign and discusses their implications for labour force statistics.

## SURVEY OBJECTIVES

The purpose of the monthly LFS is to provide timely information on the labour market activity of the usually resident civilian population of Australia aged 15 and over. The statistics of most interest each month are the estimates of the number of employed and unemployed people, the unemployment rate and the labour force participation rate. The rate of change in the number of people employed is a key indicator of the pace of economic growth. The unemployment rate (the percentage of the labour force represented by the unemployed) is the main measure of unutilised labour, and the participation rate (the percentage of the population in the labour force) reflects changes in total labour availability.

## SURVEY OUTPUT

The survey output includes information on whether employed people are employed full-time or part-time, their industry, occupation and hours worked. Of unemployed people, information is compiled about the industry and occupation of, and reason for leaving, their last full-time job. The survey classifies unemployed people according to whether they are looking for a full-time or part-time job, and the current duration of their job search. Socio-demographic information is also collected so that the labour force can be classified by sex, age, marital status and relationship in household, geographic region, participation in school and tertiary education, birthplace and year of arrival in Australia.

The data are compiled according to concepts and definitions recommended by the International Labour Organisation. Estimates are published monthly, initially in *Labour Force, Australia, Preliminary* (Cat. no. 6202.0) and later in the more detailed publication *Labour Force, Australia* (Cat. no. 6203.0). More detailed estimates are available on other media, such as floppy disk and customised reports, from ABS offices (see back page of this Information Paper).

**LIST OF ABBREVIATIONS**

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ABS	Australian Bureau of Statistics
LFS	Labour Force Survey

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## SAMPLE DESIGN

### ALLOCATION OF SAMPLE

The LFS is designed to provide reliable estimates of the key labour force statistics for both the whole of Australia and for each State and Territory. Its design also yields estimates for a number of broad regions within States.

The most accurate national estimates would be gained when the total sample for Australia is allocated in proportion to the population of each State/Territory. For each State/Territory to have estimates as accurate as every other State/Territory, equal size samples would be used.

The allocation of the sample across the States and Territories is designed to achieve a compromise between national estimates and State/Territory estimates. It results in the proportion of the population in the sample (known as the sampling fraction) for each State/Territory differing, but not to the extent that would realise identical sample sizes. Within each State/Territory, each dwelling has the same probability of selection.

### SAMPLE ROTATION

One of the primary requirements of the survey is to provide a measure of change in the characteristics of the labour force over time, especially month-to-month variations. The best way to assess changes from one month to the next would require information to be obtained from the same sample of dwellings each month. As it is not reasonable to continually retain the same respondents in the survey, a small proportion of the sample is replaced each month. This procedure is known as sample rotation.

Since the monthly LFS commenced in 1978, one-eighth of the sample has been replaced each month. The sample can be thought of as consisting of eight sub-samples (or rotation groups), with a new rotation group being introduced into the sample each month to replace an outgoing rotation group. This replacement sample generally comes from the same geographic area as the outgoing one.

The rotation procedure allows reliable measures of monthly changes in labour force statistics to be compiled, as seven-eighths of the private dwelling sample from one month is retained for the next month's survey. The component of the sample that is common from one month to the next is referred to as the 'matched sample'. The availability of this matched sample permits the production of estimates of 'gross flows' — the number of people who change labour force status between successive months. At the same time, the sample rotation procedure ensures no private dwelling is retained in the sample for more than eight months.

## METHOD OF ESTIMATION

### BENCHMARKS

LFS estimates of the number of people employed, unemployed and not in the labour force are calculated in such a way as to add up to independently estimated counts (benchmarks) of the usually resident civilian population aged 15 and over. These benchmarks are based on Census of Population and Housing data, adjusted for underenumeration and updated monthly for births, deaths, interstate migration and net permanent and long-term migration. Benchmarks are classified by State/Territory of usual residence, part of State of usual residence (capital city, rest of State), age and sex. Each cross-classification of these benchmark variables is known as a benchmark cell.

### WEIGHTS

To derive labour force estimates for the entire population in the scope of the survey, expansion factors (weights) are applied to the sample responses. Weighting ensures that LFS estimates conform to the benchmark distribution of the population by age, sex and geographic area. This reduces sampling variability and compensates for any underenumeration or non-response in the survey.

Weights are allocated to each sample respondent according to his/her State/Territory of usual residence, part of State, age and sex. In essence, weights are the inverse of the probabilities of selection, adjusted for any underenumeration and non-response. This adjustment is calculated by dividing the known population in each benchmark cell by the corresponding sample estimate. Labour force estimates for each characteristic of interest are then obtained by summing the weights of the people in the sample with that characteristic.

### STANDARD ERROR

As only a sample of all dwellings is surveyed, the statistics produced have sampling error associated with them. That is, the statistics may differ from the true value for the population. One measure of the likely difference between the sample estimate and the true population value is given by the standard error. There is about a 5% chance that the true value lies outside a range of two standard errors either side of the sample estimate. Such a range defines a 95% confidence interval for that estimate. For each sample design, standard errors are mathematically modelled using many different estimates from several months of survey responses. Tables containing standard errors for a range of possible estimates appear in *Labour Force, Australia* (Cat. no. 6203.0).

## SAMPLE RESELECTION

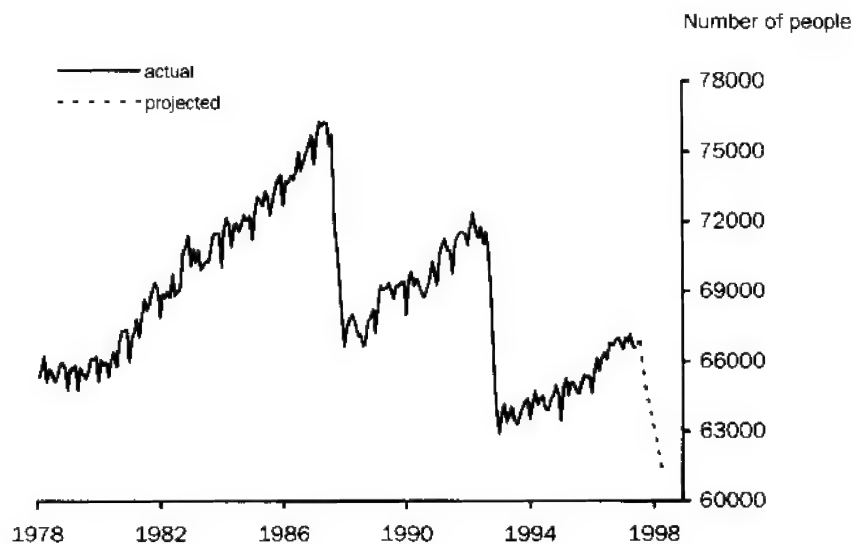
### SAMPLE SIZE

The use of a constant sampling fraction between sample redesigns has had the effect that the number of dwellings in the sample increases as the population grows. This results in some improvement in the accuracy of the survey results. However, it is partially offset by a deterioration in the efficiency of the sample in the period since the previous census.

However, as more dwellings are added to the survey over time the operational costs of collecting the data increase. To offset these increases in cost, the initial sample size was reduced at the 1986 Census redesign and has been further reduced at each redesign since. Consideration is also now being given to methods that would keep the sample size constant between redesigns, instead of allowing it to increase.

The graph below shows the sample size of the LFS from 1978 to 1997. It illustrates the gradual increase over time in the number of people sampled, and the decrease in sample size following the 1986 and 1991 Census redesigns. The dotted line at the right of the graph shows the expected decrease in sample size during the period September 1997 to April 1998, when the sample from the 1996 Census redesign will be implemented.

Labour Force Survey sample size



## PREVIOUS REDESIGNS

### CHANGES INTRODUCED

The basic methodology of the LFS has remained much the same since the first survey was run in the early 1960s. The main changes in sample design and estimation procedures introduced at each redesign since the LFS commenced can be summarised as follows.

#### 1971 redesign

- the introduction of different sampling fractions across States and Territories; and
- a reduction in sample size through reducing the overall sampling fraction from 1 in 100 to about 1 in 150.

#### 1976 redesign

- the introduction of regional stratification;
- the introduction of a one-eighth rotation scheme in the non-private dwelling sample; and
- an increase in the Australian Capital Territory sampling fraction from 1 in 200 to 1 in 100.

#### 1981 redesign

- a change in estimation procedure from State of enumeration to State of usual residence; and
- a relocation of caravan parks into the non-private dwelling sample from the private dwelling sample.

#### 1986 redesign

- a reduction in the overall sampling fraction of approximately 13%, resulting in a total initial sample size which was about 3,000 (4%) less than that at the start of the 1981 redesign sample; and
- changes to certain regional boundaries in New South Wales, Victoria and Queensland.

#### 1991 redesign

- the introduction of a new allocation formula for State and Territory sampling fractions, resulting in an increase in the sampling fractions for Territories and a decrease for States;
- a relocation of predominantly long-stay caravan parks into the private dwelling sample from the non-private dwelling sample;
- changes made to regional boundaries in Victoria and Queensland; and
- a reduction in the total initial sample size of about 3,000 (4%), compared with that initially resulting from the 1986 Census redesign.

# 1996 REDESIGN CHANGES

## SAMPLE SIZE

The overall sampling fraction for the 1996 redesign will be about 8% lower than that for the 1991 redesign. This will result in about a 2% decrease in the overall initial sample size. This decrease reflects efficiency improvements from tailoring the sample design to telephone interviewing. Telephone interviewing allows the sample to be less clustered, and hence permits a reduction in sample size without loss of accuracy in the estimates.

The new sample will be introduced over the period September 1997 to April 1998. During this eight-month period, the overall sample size will successively decrease as the new smaller sample is progressively implemented (see over). At the commencement of the fully implemented sample in April 1998, it is expected that there will be about 29,000 private dwellings and 500 non-private dwellings in the sample. This will result in about 61,500 people responding to the survey — about 1,500 (2%) less than in December 1992, when the 1991 redesign sample had been fully implemented.

The following table gives the sampling fractions used for each State and Territory from the 1976 Census redesign to the 1996 Census redesign.

State/Territory	1976 Redesign	1981 Redesign	1986 Redesign	1991 Redesign	1996 Redesign
New South Wales	1 in 200	1 in 200	1 in 230	1 in 277	1 in 300
Victoria	1 in 200	1 in 200	1 in 230	1 in 242	1 in 257
Queensland	1 in 140	1 in 140	1 in 160	1 in 195	1 in 222
South Australia	1 in 100	1 in 100	1 in 115	1 in 139	1 in 147
Western Australia	1 in 90	1 in 100	1 in 115	1 in 146	1 in 160
Tasmania	1 in 60	1 in 60	1 in 70	1 in 75	1 in 83
Northern Territory	1 in 100	1 in 100	1 in 115	1 in 75	1 in 85
Australian Capital Territory	1 in 100	1 in 100	1 in 115	1 in 75	1 in 85

## DISSEMINATION REGIONS

Estimates for the former dissemination region of Blacktown-Baulkham Hills will no longer be produced separately. Instead, Blacktown will be merged with Outer Western Sydney, and Baulkham Hills with Hornsby-Kuringai. In Queensland, an additional dissemination region will become available for the Gold Coast. Some minor changes will be made to dissemination region boundaries in all States to achieve consistency with the Statistical Region structure of *Statistical Geography: Volume 1 — Australian Standard Geographical Classification (ASGC), 1996 Edition* (Cat. no. 1216.0). These changes will become effective in September 1997, with data for the new regions being released from October 1997.

In instances where boundaries have changed, regional estimates from September 1997 onwards may not be directly comparable with those before September 1997.

Further details of changes to dissemination regions may be found in *Information Paper: Regional Labour Force Statistics* (Cat. no. 6262.0), to be released in late September 1997.

# NEW SAMPLE IMPLEMENTATION AND ITS EFFECTS

## PHASE-IN OVER EIGHT MONTHS

In order to reduce the potential impact of the change in sample on labour force statistics, the new sample will be introduced progressively. The private dwelling sample in larger urban centres and more densely populated rural areas, representing about 85% of the total sample, will be phased-in over the period September 1997 to April 1998. Within these areas, one-eighth of the new sample will be introduced each month and one-eighth of the 1991 redesign sample will be removed. Thus, from April 1998 the sample in use will consist entirely of the newly selected sample. This method of implementation means that any changes to labour force statistics due to differences between the two samples, or any other influences, will be spread over the eight months. This compares with the approach adopted for the 1981 redesign, when the sample was introduced in one month, and with that for the 1986 and 1991 redesigns, when the sample was introduced over four months.

The rest of the new sample will be introduced in two stages. This will occur in September 1997 for New South Wales, Victoria, Tasmania, the Northern Territory and the Australian Capital Territory, and in October 1997 for Queensland, South Australia and Western Australia.

## INCREASED STANDARD ERRORS

Standard errors associated with the new sample will be comparable to those of the old sample. However, the method of sample implementation described above means there will be a lower than normal proportion of common selections between August, September and October 1997. This means there will be higher standard errors for the estimates of month-to-month movements produced for September and October 1997 compared with those for other months. From November 1997, movement standard errors will return to normal levels.

## GROSS FLOWS NOT COMPARABLE

The reduced matched sample between August, September and October 1997 also means that gross flows statistics for September 1997 will represent about 70% of the survey population, compared with the normal 80%. In October 1997, gross flows statistics will represent about 75% of the survey population.

## SUMMARY

The ABS has reselected the LFS sample to incorporate information obtained from the 1996 Census. Some minor changes have also been made to the sample design. This process takes into account changes in the size and distribution of the Australian population, and meets the requirement of maintaining a statistically efficient and cost-effective sample. As part of the redesign the overall sample size will be reduced by about 1,500 (2%). The new sample will be introduced over an eight-month period, from September 1997 until April 1998, in order to minimise possible effects on the continuity of key labour force statistics.





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